

**STI (20230001861): Conference Paper Abstract**

Title: Implementation of Field-Oriented Control in Joint Actuator Electronics for Satellite-Servicing Robotics

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Event: 20<sup>th</sup> European Space Mechanisms and Tribology Symposium

Event Location: Warsaw, Poland

Event Date: 9/20/2023

Sponsor Name(s): Astronika, European Space Agency

**Abstract:**

NASA's OSAM-1 (On-orbit Servicing, Assembly, and Manufacturing 1) is a robotic spacecraft designed to extend the life of a satellite. Launching in 2026, the OSAM-1 servicer will use a robotic arm to grasp, refuel, and relocate Landsat 7. In order to accomplish the various servicing operations, including the critical auto-grapple capturing operation, the robot arm uses active compliance and visual servo control loops. These sophisticated control algorithms are enabled by the high performance Joint Control Boards (JCBs). At the core of the robot arm control architecture, the JCBs employ field-oriented control (FOC) to accurately commutate and efficiently control joint actuator torque. FOC offers numerous benefits over other current control methods, allowing the JCBs to achieve the high bandwidth and performance required by the outer control loops. As an added benefit, a torque feed-forward term allows the FOC loop to simulate microgravity actuator performance during ground testing. In this paper, a FOC implementation for space robotics applications and an end-to-end actuator calibration process are discussed.